

NOTES ON THE GEOGRAPHICAL DISTRIBUTION OF BATRACHIA AND
REPTILIA IN WESTERN NORTH AMERICA.

BY E. D. COPE.

The following notes are based on collections made by myself and my assistants at various points in the Rocky Mountain and Pacific regions during the last ten years. They describe the range of various species of our terrestrial cold-blooded vertebrata, and contribute to the final definition of the zoological provinces and districts of the continent.

1. LAKE VALLEY, NEW MEXICO.

This locality is at the western border of Doña Ana County, twenty miles N. E. of Fort Cummings. It is in the foot-hills of the Mimbres or Negretta range. The region is rather arid, springs not being numerous; but during July and August there are frequent rains. Vegetation is abundant in the form of grass and herbaceous plants and shrubs.

Scaphiopus sp. Young.

Rana halecina Kalm.

Phrynosoma cornutum Harl.

Full of eggs in June.

Phrynosoma modestum Gird.

Very abundant in August; not seen during two days' visit in June.

Crotaphytus collaris Say. Abundant.

Uta schotti Baird.

There is but one median smaller row of dorsal scales, so that the single specimen approaches the *U. nigricauda*. Specimens of this genus are abundant.

Sceloporus

A large species seen.

Sceloporus.

A small species seen.

Holbrookia maculata B. and G. Abundant.

Var. *flavilenta*, differs from the typical form in having larger prenasal scales separated by only two flat scales in front instead of four tubercular ones, and in having only four flat scales between the

nostrils above instead of six tubercular ones, and in having the scales of the front flatter. The spots are obscure or entirely wanting; when present they are more numerous than in the var. *maculata*, there being eight between axilla and groin instead of six. The sides and dorso-lateral regions are thickly marked with small yellow spots. Two specimens.

Cnemidophorus sexlineatus L.

Very abundant.

Stenostoma dulce Bd. and Gird.

One specimen.

Bascanium testaceum Say.

Eutænia cyrtopsis Kenn.

Eutænia ornata B. and G.

Crotalus scutulatus Kenn. Not rare.

Crotalus confluentus Say, var. *pulverulentus* Cope.

I propose this name for a well-marked variety of rattlesnake, which is abundant in the region of Lake Valley, especially on the grassy plains. In order to determine its relations to the species to which I refer it, I instituted a comparison with the allied forms represented in my collection. These are: Two specimens from Fort Benton, Montana; two from Central Oregon; two from Eastern California; one from Socorro, New Mexico; one from Fort Wingate, New Mexico; two from Lake Valley, New Mexico, and one from Haskell County, Texas. These represent a wide range in latitude, and are likely to give the greatest range of variation. The comparison indicates three varieties, defined as follows:—

Cephalic scales larger; four rows between superciliary plates; four rows below orbit; dorsal spots and cephalic bands light-edged; few posterior cross-bands; *confluentus*.

Cephalic scales intermediate; six rows between superciliaries; three rows below orbit (probably sometimes four); dorsal spots square, with the head-bands, not light-edged; posterior cross-bands more numerous; colors dotted with brown specks; *pulverulentus*.

Cephalic scales smallest; eight rows between superciliaries; four rows below orbit; dorsal spots and head-bands light-edged or not; numerous posterior cross-bands; *lucifer*.

The var. *pulverulentus*, at first sight, resembles the *Crotalus mitchilli*, having much the same coloration, but the head-scales and

plates are quite different. It gives out a powerful musky odor when excited, which I have not noticed in the typical form of the species. It is quite probable that it is to this variety that the specimens from Arizona should be referred, which I have heretofore placed under *C. lucifer*.¹ Not having access to the specimens at this time, I cannot determine this point positively. Of those above enumerated, the specimens from Fort Benton, Fort Wingate, from Socorro, and from Texas, belong to the typical *C. confluentus*. The others are the *C. c. lucifer*.

Crotalus molossus B. and G.

I killed a fine specimen of this species, which I discovered in the act of springing through a bush. When I struck it, it was suspended over a branch, looking at me. It was heavy in its movements, except at the moment of leaping.

2. SOCORRO, NEW MEXICO.

The collection from this region was made by Prof. Frank Snow, of the University of Kansas, at Lawrence. I here express my indebtedness to Prof. Snow for the opportunity of studying it.

Phrynosoma modestum Girard.

Phrynosoma cornutum Harl.

Phrynosoma douglassi Bell.

Crotaphytus collaris Say.

Holbrookia texana Trosch.

Holbrookia maculata B. and G.

Sceloporus poinsettii B. and G.

Uta stansburiana B. and G.

Cnemidophorus sexlineatus L.

Diadophis regalis Bd. and Gir.

The first time this rare species has been found within the limits of the United States. The single specimen obtained differs from the typical one in having eight superior labials, with the eye above the fourth and fifth. As the preorbital labials are very short, variation to seven in all may be anticipated, as is found in the type. This specimen is smaller than the one from Sonora originally described.

Bascanium constrictor L.

Eutænia marciana B. and G.

The common species of the Rio Grande valley.

¹ Proceedings Philada. Academy, 1866, 307.

Crotalus confluentus Say.

Typical variety from near the southern end of the Socorro Mountain, five miles from Socorro.

Crotalus lepidus Kennicott.

Prof. Snow was fortunate enough to obtain the first entire specimen of this species, it having been described by Kennicott from two heads. We are thus made acquainted with the most peculiar of the North American rattlesnakes. I proposed for it the genus *Haploaspis* on account of the undivided nasal plates of the typical specimens. In the present specimen, that plate is divided below the nostril. It is therefore probable that this generic name should be abandoned.

Mr. Kennicott has well described the scutellation of the head. It may be summarized here by saying that the top of the muzzle is covered by eight smooth scuta; that the rostral plate is rather low, and is in contact with the prenasal; that there are two preoculars and two loreals; and that but two scales separate the orbit from the superior labial scuta. Of the latter there are twelve. Occipital scales smooth. Scales of body in twenty-three rows, the two external on each side smooth. Urosteges, 153; gastrosteges, 27. The rattle consists of seven segments and a button, and narrows gradually towards the extremity.

The color above is a greenish gray, which is crossed by nineteen jet-black rings on the body, which do not extend on the abdomen. These rings are two and a half scales wide on the middle line, and narrow downwards on each side so as to cover but one scale in width. The scales which border the annuli are half black and half green, the effect of which is to give the edge of the ring a turreted outline. The edges of the ground-color are paler than any other part of the scales, thus throwing the black into greater relief. A large black spot, shaped like two hearts side by side, with the apices posterior, marks the nape; and there is an irregular small black spot on each side of the occiput. Some black specks between the orbits. No other marks on the head. Near the middle of the gray spaces of the body, some of the scales of many of the rows have black tips. The tail is light brown above, and has a basal broad black, and two other narrow brown annuli. Below dirty white, with closely placed shades of brown.

Total length, m. .555; to constriction of neck, .027; length of tail, .074; do. without rattle, .026.

This is one of the smallest species of *Crotalus*, and is one of the most handsomely colored. Its coloration is entirely unique in the genus. The scutellation of the muzzle places it between the two sections of the genus, typified respectively by *C. horridus* and *C. durissus*.

The specimen was captured on the summit of the Magdalena Mountains, which are northwest from Socorro twenty miles.

3. ST. THOMAS, NEVADA.

This locality is on the Virgen River, in southeastern Nevada, nearly in the latitude of the southern boundary of Utah. The collection now referred to was made by Dr. Edward Palmer and sent by him to the Smithsonian Institution. Through Professor Baird, the distinguished Secretary, it was referred to me for identification.

Bufo lentiginosus frontosus Cope.

This is the toad of the Great Basin, representing the *B. columbiensis* of more northern regions.

Crotaphytus wislizeni B. and G.

Cnemidophorus tessellatus Say.

Ophibolus getulus boyli B. and G.

The most northern locality for this species in the Great Basin. It has been previously obtained by Palmer and Coues, near Prescott, Arizona.

Phimothyra grahamiæ B. and G.

A variety with the dorsal bands nearly obsolete, and separated by three rows of dorsal scales on all parts of the body. Two preoculars on one side and three on the other. The most northern locality for this species.

4. SANTA FÉ, NEW MEXICO.

Amblystoma mavortium Baird.

Not uncommon.

Spea hammondi Baird.

Abundant in July and August, when it deposits its eggs in the pools of rain-water. It is very noisy at such times, and the open lots in the city of Santa Fé resound with its cries. They are much like those of the *Scaphiopus holbrookii*.

The range of this species is extensive. It was originally obtained near Redding in Northern California. My friend, James S. Lippincott, has sent it to me from the extreme south of California, San Diego. The Smithsonian Institution has a slightly differentiated variety from Chihuahua; and a specimen from my friend Dr. Duges, from Guanajuato, Mexico, though rather young, is apparently the same. I suspect that the *Scaphiopus dugesi* Brocchi from that locality is the same species.

This species is much like the *Scaphiopus intermontanus* described further on. It is always smaller, and the middle pair of light dorsal bands is nearly always wanting. It is still more different from the *S. varius*, which has the vomerine teeth entirely posterior to the nares, banded upper lip and marbled back.

5. SAN FRANCISCO MOUNTAINS, UTAH.

Lizards are very abundant in this region, especially in the Wah Wah Valley, on the west side of the range.

Phrynosoma platyrhinum Gird.

Very abundant.

Crotaphytus wislizeni Bd. and Gird.

Very abundant.

Crotaphytus collaris Say.

Very common.

Uta stansburiana Bd. and Gird.

Abundant.

Sceloporus smaragdinus Cope.

Not rare.

Sceloporus consobrinus B. and G.

Cnemidophorus sp.

Many seen but not caught.

6. PROVO AND SALT LAKE CITY, UTAH.

Bufo lentiginosus frontosus Cope.

Abundant near Salt Lake City.

Scaphiopus intermontanus sp. nov.

I took a specimen of this species within the limits of Salt Lake City, and subsequently obtained three or four specimens from Pyramid Lake, Nevada. It resembles the *Spea hammondi* more than it does any other species. The frontoparietal bones, though

ossified, are not roughened as in the other species of *Scaphiopus*. It is nearest the *S. varius* (from near San Antonio, Texas). In that species the vomerine teeth are entirely posterior to the internal nares; in this one they are between the posterior borders of the same. The lips are not cross-barred as in the *S. varius*; and the superior region has two pale lines on each side. In *S. varius* these lines are replaced by a coarse marbling. As compared with *Spea hammondi*, this frog differs in its larger size, lighter colors, and the presence of the superior pair of light lines.

It represents the *S. hammondi* in more northern regions, and the complete cranial ossification and larger size mark it as a more fully developed form.

Rana halecina Kalm. From Provo.

Rana pretiosa B. & G.

A variety without a trace of dorso-lateral folds, and of a uniform dusky color above and on the sides. Lip not striped. The posterior part of the abdomen and the inferior face of the thighs are salmon-red. Skin smooth; diameter of membranum tympani three-fifths that of the eye. Salt Lake City. This is the most southern locality of this species known.

Sceloporus consobrinus B. & G. Provo.

7. ATLANTA, IDAHO.

Atlanta is a small town situated on the headwaters of the South Boise River, on the southern drainage of the Sawtooth Mountain Range. The valley is quite elevated, and is shut in by granitic mountains; water and vegetation are abundant; and the snow lies on the ground late in the spring. During a short visit there in 1882, I obtained the following species:

Amblystoma epixanthum sp. nov.

Nearly related to *Amblystoma macrodactylum* Baird, and to be placed next to that species in any synopsis of the genus.¹ Costal folds twelve. No canthus rostralis. Upper jaw overlapping lower. Tail strongly compressed, as long as head and body to groin. Head wide-oval; its greatest width one-fourth its total length to the groin. Digits all rather short; four phalanges in

¹ Proc. Acad. Phila., 1867, p. 171.

fourth posterior digit. Internal nares as widely separated as the external. Eye-fissure one-half width between the anterior canthus. Median dental series presenting an angle forwards. Tongue large, deeply plicate. Length, m. .083; length to axilla, .017; to groin, .040; length of anterior limb, .012; of anterior foot, .004; of hind limb, .014; of posterior foot, .0065.

Sides of body and tail, and superior surfaces of limbs, shining black. Dorsal region to end of tail and muzzle, gamboge yellow. The yellow expands on the head, and forms two cross-bands on the upper surfaces of each of the limbs. The black of the sides is occasionally interrupted by the yellow spots irregularly placed. Below, dilute black, dusted with minute white speckles. The structural differences between this and the *A. macrodactylum* are not many, but are well marked. They are: 1. The greater width of the head, which enters the length (without the tail) five times in the latter, and four times in the *A. epixanthum*; and is also seen in the greater interorbital width. 2. In the short toes, which are very much longer in the *A. macrodactylum*. In color, this species is the more brilliant; the coast species being described as brown, with gray dorsal stripes, instead of black, with yellow dorsal stripes. In it the limbs are not banded, and the belly is uniformly pale, contrary to what holds in the present species, which is the most handsome of the genus. I obtained four specimens of this salamander, under logs, in a swamp near the head of the South Boise River, on the south side of the Sawtooth Mountain Range, Idaho.

Bufo columbiensis Bd. and Gird.

Abundant. I also obtained it at Bellevue on the Wood River, about one hundred miles southeast of Atlanta.

Bascanium vetustum Bd. and Gird.

Eutænia sirtalis Linn.

These are all, except the last, species characteristic of the northern fauna of Washington Territory. The *Bufo columbiensis* ranges to the headwaters of the Missouri.

8. MOUTH OF BRUNEAU RIVER, IDAHO.

This locality is on Snake River, which cuts through the great lava outflow of southern Idaho and Oregon. The reptiles are

different from those of Atlanta, and are those of the great basin of Utah. I am indebted to Mr. J. L. Wortman for these specimens.

Phrynosoma platyrhinum Gird.

Crotaphytus collaris Say.

Crotaphytus wislizeni B. and G.

Uta stansburiana B. and G.

Sceloporus smaragdinus Cope.

Pityophis catenifer Blainv.

Bascanium vetustum B. and G.

The head is a little longer than in a specimen from central Oregon, and the muzzle is less conical. The fifth superior labial just reaches the inferior postorbital.

9. FROM RENO TO PYRAMID LAKE, NEVADA.

The road from Reno to the southern extremity of Surprise Valley, California, passes through an arid and forbidding country. The rocks are entirely basaltic, and frequently present a rugged foundation for the road. The vegetation consists of *Artemisia*, and where alkali abounds, of *Sarcobatus*. North of Pyramid Lake, the dry alkaline flats once covered by the Alkali Lake, have a wide extent. During the hot weather of July, 1882, the region swarmed with lizards, and rattlesnakes were numerous. The greatest number of both was met with from Pyramid Lake northwards for twenty miles.

Bufo columbiensis Bd. and Gird. Pyramid Lake.

Scaphiopus intermontanus Cope.

With the preceding species in a pond near the shore of Pyramid Lake. Like other allied species, it was very noisy, almost obscuring the voice of the less vociferous *Bufo*.

Phrynosoma platyrhinum Gird.

Very abundant.

Crotaphytus collaris Say.

Crotaphytus wislizeni B. and G.

More abundant than the *C. collaris*.

Holbrookia sp.

A fine species was seen north of Pyramid Lake, but it was so swift that I did not succeed in catching a specimen. It resembles the *H. texana*, and may be an undescribed species.

Sceloporus smaragdinus Cope.

A variety with one additional row of small supraorbital scales, making six rows in all.

Cnemidophorus tessellatus Say. Abundant.

Bascanium sp. Young.

Crotalus confluentus lucifer B. and G. Cope emend. supra, p. 11.

Two specimens from Buffalo Canyon, north of Pyramid Lake. In one of the specimens the dorsal spots are first darker, then lighter-bordered, and there are twenty-three rows of scales on the body. In the other there are twenty-five rows of scales, and the spots have neither dark nor pale borders, but have pale scales scattered through them, and they have a more transverse form.

10. THE LAKES OF SOUTH AND WEST CENTRAL OREGON.

This region possesses much zoölogical interest from the position which it occupies as the border-land between the faunæ of the Pacific slope and that of the great interior basin. It is here that we find the transition between the sage-brush (*Artemisia*) desert and the forest-covered Sierra Nevada Mountains and valleys. Here also we have the transition between the almost fresh lakes near the mountains, to the intensely alkaline ones east of them. An especial interest attaches to the lake faunæ; since we find in them the means of determining the characters of the fossils found in the remains of pliocene and post-pliocene lakes of the Oregon desert. This part of the subject will be more fully considered in an essay on the fishes of these lakes, now in course of preparation.

The routes on which the species of the list below given, were collected, are as follows: Along the east shore of the Great Klamath Lake to its northern extremity. From the eastern side of the lake northeastward to Silver Lake. This was part of my expedition of 1879. In 1882, I passed along the three southern Warner Lakes, and then crossed southwest to Goose Lake. Thence I traveled north to Summer Lake, crossing the Chewaucan River, which flows into Abert's Lake. Then north to Silver Lake, connecting with my route of 1879. After that, south to Goose Lake, passing along its entire eastern shore.

Bufo columbiensis Bd. and Gird.

Abundant throughout the entire region. It is especially numerous at Klamath Lake, where it covers the basaltic blocks which lie partially in the water, concealed by the *Typhææ*, which grow from the bottom. They accumulate there in large piles, sometimes as large as a bushel-measure, and afford abundant food for the *Eutæniæ*, which are scarcely less abundant. One specimen of

this toad was as large as the average *Bufo marinus* of Brazil, and a specimen seen at Warner's Lake was but little smaller.

Hyla regilla B. and G.

Abundant at Silver Lake, at Warner's Lake, Goose Lake and at Fort Bidwell, twenty miles east of Goose Lake, in California, I found numbers of what I suppose to be a variety of this species. It is little over half as large in linear dimensions, and the skin is more distinctly tubercular above. Some of those from Goose Lake are more spotted; those from Fort Bidwell are nearly uniform golden-yellow and green. This species lives in swamps and on the edge of water, representing in this region the *Acris* and *Chorophilus* of the east.

Rana pretiosa Bl. and Gird.

This is the characteristic *Rana* of the northwestern interior, being accompanied by *Bufo columbiensis* and *Bascanium vetustum*. In life the posterior part of the abdomen, with the inferior faces of the thighs, are of a bright salmon-red. I obtained it the entire length of the valley of the Warner Lakes, but not at Fort Bidwell. I have found it to range as far as the eastern foot of the Rocky Mountains in Montana;¹ and the specimens assigned by me² to *Rana septentrionalis*, from the Yellowstone Basin, may be the variety described above from Salt Lake City. I do not now have them before me for decision. Specimens of this species are in the National Museum, from Puget's Sound (Dr. Kennerly, No. 5975 a) and from "Camp Moryie" (Dr. Kennerly, No. 5973). The first-named specimens are accompanied by the *R. temporaria aurora*. Its habits are aquatic.

Phrynosoma douglassi Bell. Var.

On the elevated land which represents the Sierra Nevada Range, between Warner's Lake and Goose Lake, in the basaltic region, near the former, I found a peculiar variety of this species. The horns are even more rudimental than in the usual form, but are all represented. The prominent scales of the back are smaller and less prominent. In some of the specimens the head is shorter relatively to the body. The color is an ironrust-brown, with darker lateral spots, each with a small posterior yellow border.

¹ American Naturalist, 1879, p. 435.

² Annual Report U. S. Geol. Survey Terrs., 1874, p. 469.

Individuals are abundant; some of those taken are full of eggs. All are much smaller than the true *P. douglassi*.

Uta stansburiana B. and G.

Abundant on the crags of basalt on the sides of Warner's Valley. It is also common at Summer Lake, which is the most northern locality for the species and genus.

Sceloporus graciosus B. and G.

This very pretty species extends as far north as Summer Lake, and is quite abundant.

Sceloporus smaragdinus Cope.

Common as far north as Summer Lake. A specimen taken there has large turquoise-blue spots behind each brown cross-bar, on each side of the dorsal region.

Charina plumbea Bd. and Gird.

I found a single specimen of this curious snake in the road along the west side of Summer Lake. Although living, its muscles were alternately contracted in such a way as to give it the appearance of a knotted root. It was very tame, allowing itself to be handled without offering resistance. In life the inferior surfaces are of a rich yellow.

Pityophis mexicanus bellona B. and G.

From Summer Lake.

Bascanium vetustum B. and G.

Common in Warner's Valley, at Summer Lake and at Klamath Lake.

Eutænia pickeringii B. and G.

Very common everywhere near water, in all parts of the Lake country.

Eutænia sirtalis sirtalis Linn.

This species accompanies the preceding at Warner's third Lake, at Summer Lake and at Goose Lake, and retains its distinctive features. The specimens seen at Goose Lake have the bands brighter yellow than usual, and are very pugnacious. They preferred fighting to escaping, and bit furiously.

Eutænia sirtalis elegans B. and G.

Abundant. In young specimens the dorsal spots are distinct.

Eutænia bisoutata sp. nov.

This is one of the best defined species of the genus. I have only two specimens, which agree in the following characters.

They differ in the number of rows of scales, however, one having twenty-three and the other twenty-two. All the rows of scales keeled, the median ones very strongly. Labials eight, the eye resting on the fourth and fifth. Two preoculars; three postoculars. The muzzle is rather short, the frontal plate exceeding in length the region anterior to it, and equaling the common suture of the parietal scuta. Nasals rather short; loreal as long as high; inferior preocular nearly square; superior preocular not reaching frontal. Superior labials all truncate above and none of them elevated, the sixth touching the inferior postorbital. Temporals, 1 · 2 · 3; the anterior are rather large. Pairs of genials subequal. Gastroteges, 156; urosteges, 79.

Color everywhere black, except on the chin and throat, and on the inferior side of the tail. The former was reddish in life. There are very faint traces of stripes on the third and fourth, and on the median dorsal rows of scales. No traces of spots on the parietal scuta.

Total length, m. 0·265; length to canthus of mouth (axial), ·012; length of tail, ·062.

This species is one of the best characterized of the genus. Its leading peculiarities are: first, the two preocular scuta; second, its twenty-three rows of scales. In both respects it is unique in the genus. Its color is characteristic. Its place is nearest the *E. radix* B. and G., with which it agrees in its rather robust proportions, and the position of the lateral stripe.

This species is not uncommon in the swamp vegetation on the borders of the lake. The specimens I took displayed little activity.

Crotalus confluentus lucifer B. and G.

This species is abundant at Warner's second Lake, and I took one at Silver Lake. The specimens are identical with those from near Pyramid Lake, Nevada.

11. THE WILLAMET VALLEY, OREGON.

The fauna of this valley is that of western Oregon, and may be expected to differ from that of central and eastern Oregon. The climate of the Willamet Valley is very wet, and the soil is densely covered with forests. This is a state of things almost exactly the reverse of what obtains in central Oregon. Appropriately we have numerous species of salamanders and fewer

lizards than in the latter region. This collection was made by my friend, Professor O. B. Johnson, at that time residing at Salem. The specimens were obtained at various points between that city and Portland, north of it.

Amblystoma tenebrosum Bd.

Amblystoma maorodactylum Bd.

Plethodon intermedius Bd.

Cynops torosus Esch.

Bufo halophilus B. and G.

Hyla regilla B. and G.

Eumeces skiltonianus Bd.

Gerrhonotus multicarinatus Blv.

Sceloporus undulatus thayeri B. and G.

Phrynosoma douglassi Bell.

Charina plumbea B. and G.

Diadophis punctatus pulchellus B. and G.

Bascanium vetustum B. and G.

Eutænia leptocephala B. and G.

Of three specimens, two exhibit only seventeen rows of scales. These probably represent the supposed species *E. cooperi*, which is therefore not distinct.

Eutænia concinna Hallow.

I took a specimen of this beautiful snake at Eugene City, south of Salem. Not only the lateral vertical bars, but the muzzle, lips and gular region are a brilliant red.

12. NORTHERN CALIFORNIA.

The species referred to in this list were found near the United States fish-hatching establishment on the McCloud River, in Shasta County. I desire here to express my indebtedness to Mr. Livingston Stone, superintendent of the hatching station, for the hospitality which he extended to me at the time of my visit there.

Amblystoma (?) *tenebrosum* B. and G.

A large sireon from a small tributary of the McCloud is probably this species. It has peculiarities of the branchial structure, and I describe it by comparison with those found in other genera of American salamanders. These are mostly derived from specimens placed in my hands by the Smithsonian Institution, to which my acknowledgments are due. The coloration which appears in the

larger larvæ of the present collection, approaches nearest that of the *Amblystoma tenebrosum*. These animals were abundant in the small stream I examined, and swam with great rapidity, darting about and hiding themselves among the fallen leaves that covered the bottom.

I. Processes with two rows of rami :

Rami with many thread-like fimbriæ ; *Siren*.

II. Processes with one—an outer—row of rami ;
processes horizontal.

A rudimental inner row of rami ; fimbriæ thread-like ; *Proteus*.

III. No principal rami ;

A. Processes compressed ; fimbriæ dependent from
lower edge ;

Fimbriæ thread-like, extending on both outer and inner face of
process ; *Necturus*.

Fimbriæ flat, long, chiefly confined to the lower margin of process ;
Larvæ of *Spelerpes ruber* ; *S. bilineatus*, and *Gyrinophilus
porphyriticus*.

Fimbriæ few, subclavate ; *Plethodon cinereus*.

AA. Processes long, narrow ; bearing fimbriæ only
on the side next the body ;

Fimbriæ simple, flat, sub-equal ; *Amblystoma*.

AAA. No processes nor rami ; fimbriæ on the vertical
septa.

Fimbriæ in numerous rows on the edge of the septa ; slender,
unbranched ; *Larva of Amblystoma tenebrosum*.

AAAA. Processes vertical septa, with rami on the
anterior edge ;

Rami bearing flat, thread-like fimbriæ, which arise from the pro-
cesses posteriorly and are often divided. *Larva from Simiah-
moo, Washington Terr.*

***Plethodon icæanus* sp. nov.**

This salamander resembles the *Plethodon glutinosus* in various respects, especially in coloration. It has, however, a compressed tail like the *P. intermedius*, and short series of vomerine teeth.

The vomerine series are straight, and do not quite meet on the middle line. They are entirely behind the nares, and do not extend exterior to them. The parasphenoid patches are united into one, and are well separated from the vomerines.

Form rather stout, and the tail short, equaling (from vent) the

length of the body (with vent) to the gular fold. Costal folds 13. Head a longitudinal oval, with rather narrowed, and not truncate muzzle; its length (to occiput) contained three and two-third times in length from muzzle to groin.

Limbs short; when pressed along the side they are separated by three intercostal spaces. The digits are short, and the internal ones are rudimental.

The color is black everywhere, and the superior surfaces are dusted over with minute light specks.

<i>Measurements.</i>	M.
Total length, . . . . .	.053
Length from muzzle to axilla, . . . . .	.0105
Length from muzzle to groin, . . . . .	.0275
Width of head at canthus oris, . . . . .	.006
Length of anterior limb, . . . . .	.006
Length of anterior foot, . . . . .	.002
Length of posterior limb, . . . . .	.0075
Length of posterior foot, . . . . .	.0032

This species is to be compared with the *Plethodon intermedius* of western Oregon. It is shorter and more robust in form, having only thirteen costal plicæ instead of fifteen.¹ The color is very different.

This species is named from the aboriginal name Iëka, of the grand peak of northern California, Mount Shasta. From the same name the town of Yreka derives its name. So I am informed by Judge Roseborough of that place, to whom I am under great obligations for many facilities and much information.

Cynops torosus Esch. *Diemictylus torosus* Cope, Check List, Batr. Rept., N. Amer.

Bufo halophilus Bd. and Gird.

Hyla regilla B. and G.

The typical form.

Rana pachyderma sp. nov.

Represented by five specimens of different ages and sizes from

¹ On page 99, Proc. Phila. Academy, 1869, in my monograph of the *Plethodontidæ* the number of plicæ is given at 13. This is a misprint for 15. On p. 209, Proceedings for 1867, the number is correctly given as 15.

the McCloud River, and by two specimens from Ashland at the northern base of the Siskiyou Mountains, Oregon.

This species belongs to the *Rana temporaria* group, and must be compared with *Rana temporaria aurora* B. and G., and *R. pretiosa* B. and G. The vomerine teeth are opposite the posterior border of the choanæ, and form two short, transverse series. The toes are webbed to the base of the terminal phalange of the fourth digit. The hind-leg extended reaches the extremity of the muzzle with the heel. There are two plantar tubercles. The internal is narrow, rather prominent and with obtuse extremity; the other is at the base of the fourth metatarsal bone, and is rounded.

The muzzle is obtuse and the head rather wide. Its greatest width at the position of the membranum tympani, equals the length from the end of the muzzle to the line connecting the axillæ in some specimens; in others to that connecting the middle of the humeri. The skin is on all the superior surfaces thick and glandular. This condition is especially marked in the dorso-lateral fold of each side, which is so thickened in front as to resemble a parotoid gland. This becomes less visible in alcohol. The tympanic membrane is either entirely concealed, or is represented by a depression only. The skin covering it is roughened. A groove extends downwards and backwards from it. Between this and the canthus oris is a glandular thickening, and behind it are two others, one above the other. Posterior to these on the sides is a succession of rounded, roughened warts, similar to those of the toads. Similar warts, but less prominent, are scattered over the dorsal region, and are numerous near the extremity of the coccyx. The skin of the superior surfaces of the head, body and limbs is minutely but very distinctly roughened by small warts, each of which gives exit to a pore. Inferior surfaces smooth. Length of fingers beginning with the shortest, 2 · 1 · 4 · 3.

The color is dark brown or nearly black, with indistinct darker spots on the back; sides brown. Axilla and groin yellow, marbled with black. Thighs above light or dark brown, with three darker crossbars. Tibiæ similar, with three crossbars. Thighs behind, black, coarsely vermiculated with yellow, or yellow closely spotted with black. Below light yellow, spotted with brown on the gular region and on front of femora.

<i>Measurements.</i>	M.
Length of head and body to vent, . . . . .	.066
Length from muzzle to axilla (axial), . . . . .	.030
Length from muzzle to groin (axial), . . . . .	.054
Length of anterior leg, . . . . .	.043
Length of manus, . . . . .	.019
Length of posterior leg, . . . . .	.117
Length of femur, . . . . .	.033
Length of tibia, . . . . .	.038
Length of tarsus, . . . . .	.018

The specimens from Ashland agree with those from the McCloud, except that they are nearly black above and do not exhibit the dorsal spots.

I compare this species with the *Rana temporaria aurora* from the Russian River near the coast of California. That species has but one palmar tubercle, the internal, which is of similar proportions to that of the *R. pachyderma*. The skin is not thickened, and is much less glandular everywhere. The membranum tympani is entirely distinct. The posterior face of the femur is not vermiculated with yellow, but is covered with large black masses. The whole of the under surfaces are brown-spotted. There are four brown crossbars on the tibia: traces of the fourth sometimes appear in the *R. pachyderma*. From *Rana pretiosa* it differs in all these characters; besides those that belong to the latter, *i. e.*, the posteriorly-placed vomerine teeth and the short hind-legs.

Eumeces skiltonianus B. and G.

Gerrhonotus multicarinatus Blv.

The movements of this species are not nearly so active as are those of the *Iguanidæ* and especially of the *Lacertidæ*.

Sceloporus undulatus thayeri B. and G.

Diadophis punctatus pulchellus B. and G.

Different from the typical form of the subspecies in having no spots on the inferior surfaces. I did not admit this form as distinct in my check list, but it had best be retained. It differs from the subspecies *amabilis* in having the inferior two rows of scales unicolor with the abdomen. In life this is a brilliant orange.¹

¹ At this locality I found, under bark of logs, numerous specimens of *Brachycybe lecontei* Wood. This beautiful myriapod was originally described

13. MOUTH OF RUSSIAN RIVER, CALIFORNIA.

This locality is one hundred miles north of San Francisco. The collection was made by myself, in and on the border of the great redwood forest which there covers the hills and mountains of the coast range.

Batrachoseps attenuatus Esch. Abundant.

Plethodon oregonensis Gird.

Abundant, and especially pleasing from its liquid, prominent eyes. Always under the redwoods.

Cynops torosus Esch.

Abundant. This species is entirely aquatic.

Rana temporaria aurora B. and G. *Rana draytoni* B. and G. *Rana longipes* Hallow.

Not distinguishable as a species, in my opinion, from the *Rana temporaria* of the palæarctic realm.

Gerrhonotus multicarinatus Blv.

Eutænia sirtalis elegans B. and G.

14. LOS ANGELES, CALIFORNIA.

Two collections from this locality are before me. One of these was made by Mr. DeCorse, Hospital Steward, at Drum Barracks, and was sent to the Smithsonian Institution. Prof. Baird submitted it to me for determination. The second collection was given me by Mr. Horatio N. Rust, the archaeologist, who made it at Pasadena, a short distance from the city.

Cynops torosus Esch. Rust.

Batrachoseps attenuatus Esch. Rust.

Phrynosoma blainvillii Gray. DeCorse.

Sceloporus undulatus thayeri B. and G. Rust.

Uta stansburiana B. and G.

as from California, where it was supposed to have been collected by Dr. J. L. Leconte. I, however, subsequently obtained it from East Tennessee, and as Dr. Leconte had collected it in Georgia, it was supposed by Dr. Wood that the locality California was an error. Its rediscovery on the McCloud River shows that this species is found on the Pacific coast, as originally stated by Wood, and that it ranges over the width of the continent. In like manner a myriapod which I sent Mr. Ryder from the Russian River, is stated by him to be much like *Andrognathus* Cope, a genus heretofore known from the Alleghenies of Virginia.

Specimens remarkably large, and with the postinguinal black spot unusually large and distinct. DeCorse.

Gerrhonotus multicariaatus Blv. Rust.

Eumeces skiltonianus Bd. Rust, DeCorse.

Ophibolus getulus boylii B. and G. Rust.

Fityophis catenifer Blv. Rust, DeCorse.

Bascanium testaceum Say. Rust, DeCorse.

Eutænia hammondi Kenn. DeCorse.

Note on a Species of Xantusia.

The species described below was found by Dr. J. G. Cooper, Zoölogist of the State Geological Survey of California, and was placed in the collections of the University of California, where I saw it. It was kindly lent me for examination by the authorities of the University. The locality from which the specimen was derived is unknown, beyond that it is Californian.

Xantusia riversiana Cope. American Naturalist, 1879, p. 801.

The position of this genus in the system has been discussed by M. Bocourt¹ and myself.² I associated it with the genera *Lepidophyma* Dum., and *Cricosaura* Peters, and stated that I was not able to distinguish them from the family *Lacertidæ*. M. Bocourt places these genera in the family "Trachydermi," which also includes *Heloderma* Wieg. This family is divided by M. Bocourt into two subfamilies, the *Glyphodonti* for *Heloderma*, and the *Aglyphodonti* for the three genera named, together with *Xenosaurus* Pet. Previously to this³ I had examined and compared the osteology of *Heloderma* and *Xenosaurus*. On account of the differences in the form of the mesosternum, and in some other points, I regarded *Xenosaurus* as the type of a peculiar family to be placed with the *Helodermidæ* in the tribe Diploglossa. *Xantusia*, *Lepidophyma* and *Cricosaura* are, on the other hand, not Diploglossa, but are *Leptoglossa*. They are allied to the *Lacertidæ*, and especially to the Asiatic *Ophiops*, which is, like them, without eyelids. The character of the tongue is like that of the *Ecpleopidæ*, uniformly squamous, and has no resemblance to that of the *Diploglossa*. The characters of the scapular arch are those of the *Leptoglossa*. The clavicle is loop-shaped proximally, and the

¹ Mision Scientifique de Mexique, Herpetology, p. 303, 1878.

² Proceedings of the Academy of Philadelphia, 1864, p. 229.

³ Loc. cit. 1866, p. 322.

mesosternum is cruciform in *Lepidophyma* and *Xantusia*. I have not been able to examine *Cricosaura* as to these points. In my paper first mentioned, I stated that these genera have distinct parietal bones. I think that they should, on this account, be distinguished from the *Lacertidæ*, where they are coössified. Whether they are distinct or united in the *Ecleopidæ*, I do not know, but the absence of eyelids will separate the group from that family. I use for it the name first given by Baird,¹ *Xantusidæ*, and characterize the three genera as follows:—

I. A large interfrontonasal plate; frontoparietals meeting on the middle line.

Superciliary scales none; pupil round; *Lepidophyma*.
Superciliary scales present; pupil vertical; *Xantusia*.

II. Two interfrontonasals; frontoparietals separated by interparietal.

Superciliary scales; *Cricosaura*.

All of these genera have femoral pores, and an exposed membrum tympani.

The species which has given occasion for the above discussion is the second one of the genus. It is several times as large as the type *X. vigilis* Baird, and has a different coloration. The digits are shorter.

The scales of the dorsal and lateral regions are rather coarsely and uniformly granular. The abdominal scales are quadrate, and are in sixteen longitudinal and thirty-two transverse rows. The preanal scales are in three transverse rows, the anterior two of four scales, with the median pair in both much enlarged, and the posterior row of six scales. Scales of the gular region flat and hexagonal, one row on the gular fold a little larger, and equal to the anterior gulars. Scales of the anterior aspects of the fore-leg and femur larger than the others; those of the tibia small, and those of the posterior face of the femur still smaller. Scales of the tail in whorls of equal width. The scales of equal size, and all convex in cross-section but not keeled. None of the scales of the body or limbs keeled.

The nostril is situated in a small scute at the junction of the sutures which separate the internasal, rostral, first labial, and first

¹ Proceedings Academy Philadelphia, 1858, December.

loreal scuta. Three loreals, increasing in size posteriorly. A circle of scales surrounds the eye, of which the superior or superciliary are the largest. The latter are separated by one row of scales from the parietal, supraorbital and frontal on each side. The interfrontonasal is nearly square. The frontonasals are considerably in contact. The frontal is hexagonal, and is broader than long. The interparietal is as large as each parietal. It is longer than wide, and notches the contact of the frontoparietals. The occipitals are large and quadrate. A single large temporal bounds the parietals and occipital, and it is followed by two small scuta which are in contact with the occipital. There are eight scales on the upper lip. Of these the fifth is the largest, and is part of an annulus which begins with two small scales at the posterior loreal, and terminates at the seventh scale, opposite the middle of the pupil posteriorly. The posterior labials are small, and are separated by nine rows of still smaller scales from the large temporal. No large auricular scales. The eye is rather large and its diameter is contained in the length of muzzle in front of it 1.75 times. The vertical diameter of the auricular meatus is a little less.

The first digits of both extremities are very short. The second of the pes is very little longer than the fifth. All the ungues are acute and are moderately curved. The hind-legs are remarkably short, not exceeding the fore-legs. Extended forwards the extremity of the fourth digit reaches the elbow of the appressed fore-leg. Femoral pores twelve on each side; no anal pores. The tail is not long, and its form is compressed with a flat inferior surface. The section is a triangle, higher than wide, with the apex narrowly truncate.

The color is light brown, with dark umber-brown spots on the superior surface. These spots form, in general, one median and two lateral rows, but as their forms are very irregular this order is obscure. The median dorsal are the largest, and they send branches laterally and anteroposteriorly, so that the result is rather confused. Dark brown bands cross the muzzle on the frontonasal plates and on the frontal, and form a wide U from the frontoparietals passing around the posterior edge of the occipitals. Sides of head with rather large brown spots. Inferior surfaces with minute brown spots which are least numerous on the middle line. Tail with irregular pale spots.

<i>Measurements.</i>		M.
Total length,	. . . . .	.118
Length to posterior edge of occipital plates,	. . . . .	.0162
Length to axilla,	. . . . .	.029
Length to groin,	. . . . .	.055
Length to vent,	. . . . .	.060
Width between orbits above,	. . . . .	.007
Width at temples,	. . . . .	.0115
Length of fore-limb,	. . . . .	.017
Length of manus,	. . . . .	.008
Length of hind-limb,	. . . . .	.023
Length of pes,	. . . . .	.011
Length of tibia,	. . . . .	.007

15. SAN DIEGO, CALIFORNIA.

My friend, James S. Lippincott, made a collection of reptiles and batrachians at this locality, which throws considerable light on some points of geographical distribution. A catalogue of the species is here given:—

Bufo columbiensis Bd. and Gird.

A single specimen with smoother skin than the more northern forms. Gland on the surface of the tibia very distinct.

Spea hammondi B. and G.

See *antea*, page 14. Four specimens.

Eumeces skiltonianus Baird.

A specimen with the scales of the dark bands pale centered, and with a very thick tail.

Verticaria hyperythra Cope.

Cnemidophorus tessellatus tigris B. and G.

Aniella pulchra Gray.

Gerrhonotus multicarinatus Blv.

Uta stansburiana B. and G.

Crotaphytus wislizeni Bd. and Gird.

Phrynosoma blainvillei Gray.

Rhinochilus lecontei B. and G.

Hypsiglena ochrorhynchus Cope.

Bascanium testaceum Say.

GENERAL OBSERVATIONS.

The results to zoölogical geography obtained by the preceding identifications are as follows:—Collection No 1. The extension

northwards of the ranges of *Crotalus molossus* and *Stenostoma dulce*. No. 2. The extension northwards of the ranges of *Diadophis regalis*, *Crotalus lepidus* and *Holbrookia texana*. No. 4. The extension to the Rocky Mountains of the range of *Spea hammondi*. No. 6. The discovery of a new *Scaphiopus* in the Great Basin district; and of the southern extension of *Rana pretiosa* into the same. No. 7. The discovery that the Northern Pacific fauna extends east to the Rocky Mountains. This fauna is especially represented by *Bascanium vetustum*, *Rana pretiosa* and *Bufo columbiensis*. No. 8. The fact that the Great Basin district of the Sonoran fauna extends north to the southern slope of the Rocky Mountains in Idaho, where are found several of its species. These are *Phrynosoma platyrhinum*, *Crotaphytus wislizeni*, and *Uta stansburiana*. No. 9. The discovery that the same fauna extends north along the eastern slope of the Sierra Nevada to the beginning of Surprise Valley, California. No. 10. The determination that the Northern Pacific fauna extends from Surprise Valley, eastern California, northwards as far as my explorations have extended, viz., to Silver Lake and Klamath Lakes. No. 15. The determination of a wide southern range for *Spea hammondi* and *Bufo columbiensis*, and northern range for *Verticaria hyperythra*.

These results indicate that the Pacific region has a much greater extension eastward than it has been supposed to have, but which was foreshadowed in my paper on the Zoölogy of Montana, published in 1879.¹ They also indicate that it must be divided into three districts. These I call the Idaho, the Willamet, and the South Californian districts. The first is characterized by the absence of *Gerrhonotus* and *Cynops* and of certain species of *Amblystoma*. The South Californian is characterized by the presence of *Hypsiglena* and *Rhinochilus*, and absence of *Amblystoma*. It is allied to the Sonoran region, to which it is adjacent.

As regards the relation which the Sonoran region as a whole bears to the Nearctic and Neotropical realms, some remarks may be in place here. It is a question with some naturalists to which of the two it should be referred, and some would exclude it from the Nearctic without fully determining its relations to the Neotropical realm:

There can, however, be no doubt that it lacks all the peculiar

¹ American Naturalist, p. 435.

features of the Neotropical realm, and if it lacks some of those of the Nearctic also, its types are mostly representative of the latter rather of the former. I content myself here with confirming this general principle by reference to the principal families and genera of cold-blooded vertebrata.

R. Nearectica.	R. Sonoriana.	R. Neotropicalia.
	PISCES.	
Salmonidæ.	Salmonidæ.	
Cyprinidæ.	Cyprinidæ.	Characinidæ.
Catostomidæ.	Catostomidæ.	
	BATRACHIA.	
Ranidæ.	Ranidæ.	
Scaphiopidæ.	Scaphiopidæ.	
Amblystomidæ.	Amblystomidæ.	Cystignathidæ.
	REPTILIA.	
	<i>Lacertilia.</i>	
Sceloporus.	Sceloporus.	Liocephalus.
Eumeces.	Eumeces.	Mabuia.
	<i>Ophidia.</i>	
Bascanium.	Bascanium.	Bothrops.
Tropidonotus.	Tropidonotus.	Drymobius.
Eutaenia.	Eutaenia.	Helicops.
Pityophis.	Pityophis.	
Diadophis.	Diadophis.	Rhadinæa.
		Coniophanes.
Ophibolus.	Ophibolus.	Erythrolamprus.
		Pliocercus.
		Oxyrrhopus.
		Sibon.
		Leptognathus.
		Boa.
		Xiphosoma.
	Stenostoma.	Stenostoma.

There are a good many genera which are found in the Sonoran district, which do not occur in other parts of the Nearctic realm. These genera are frequently confined to it, but when they are not,

they are to be looked for in the Mexican region of the Neotropical realm. I give a list of these genera, with a corresponding one of the Mexican region, to illustrate the extent of the similarity between the two regions.

R. Sonoriana.		R. Mexicana.
Plagopterinæ.	PISCES.	
	REPTILIA.	
	<i>Lacertilia.</i>	
Heloderma.		Heloderma.
Crotaphytus.		
Uta.		
Uma.		
Callisaurus.		
	<i>Ophidia.</i>	
Gyalopium.		Ficimia.
Phimothyra.		Phimothyra.
Trimorphodon.		Trimorphodon.
Hypsiglena.		Hypsiglena.

It seems then that the Neotropical relationships of the Sonoran region are not great. In this consideration I have omitted the genera which are common to the Mexican region and the Nearctic realm in general. Such are *Ranidæ*, *Cnemidophorus*, *Sceloporus*, *Bascanium*, *Tropidonotus*, *Eutænia*, *Pityophis*, *Spilotes*, *Ophibolus* and *Elaps*. These forms serve to indicate the affinity between the Nearctic realm and the Mexican region. The line between the two is, however, not yet exactly drawn. The former extends on the west coast at least as far south as Guaymas, and on the plateau as far as Guanajuato. On the east coast the Neotropical fauna reaches near to the Rio Grande. See On the Zoölogical Position of Texas, by the writer, in Bulletin U. S. National Museum, No. 20, August, 1880; and Eleventh Contribution to the Herpetology of Tropical America, by E. D. Cope, Proceedings Amer. Philosoph. Society, 1879, p. 267.